

CEREAL / SCIENCE *Today*

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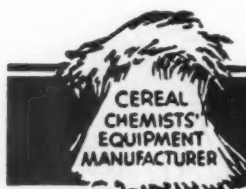
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The Vital Story of Vitamin B₁

(Thiamine)

by Science Writer

History. The discovery of vitamin B₁ resulted from research into the cause of beriberi. Almost 50 years passed between Eijkman's discovery of the relationship of the disease to diet and the famous work of Jansen and Donath who first isolated the crystalline vitamin from rice bran.

Within ten years of that first isolation the vitamin's chemical structure was determined and it was successfully synthesized.



Eijkman's work resulted in the development of a theory that beriberi was caused by a lack of some factor in the diet and not by a toxin or infectious agent. This idea was not readily accepted until the growth of dietary knowledge proved it correct.

Isolation and Synthesis. In 1926 Profs. Jansen and Donath accomplished the isolation of crystalline vitamin B₁ from rice bran. In 1931 Windaus and co-workers successfully isolated pure vitamin B₁ and established its empirical formula. In 1936 R. R. Williams, and independently R. Grewe, explained the vitamin's chemical structure. That year, R. R. Williams and J. K. Cline accomplished the synthesis of thiamine which is in wide use today. Andersag and Westphal also synthesized the vitamin in 1936. Another synthesis was described by Bergel and Todd in 1937.



Photomicrograph of B₁ crystals

Chemical and Physical Properties. Thiamine hydrochloride is white, water soluble, with a nut-like, salty taste and yeast-like odor. Its empirical formula is: C₁₂H₁₇ClN₄OS · HCl. Thiamine produced by synthesis is identical chemically and in biological activity with that obtained in pure form from nature.

Deficiencies. A deficiency of thiamine is characterized by these symptoms: depression, irritability, fearfulness, lack of initiative and interest, loss of appetite. Symptoms vary since in usual practice deficiencies of other water-soluble vitamins occur. Medical

treatment is simple: a sufficient amount of thiamine is administered to relieve symptoms quickly and the physician provides for a continuing adequate intake.

A severe deficiency of thiamine leads to beriberi, a serious and sometimes fatal disease. While beriberi is almost a medical curiosity in the United States, it is common in countries in which polished white rice is a staple of the diet.



Beriberi victim

Human Nutrition Requirements. Thiamine is one of the nutritive elements the human body needs daily and does not store in quantity. The minimum daily requirements established by the U. S. Food and Drug Administration for the prevention of symptoms of thiamine deficiency disease are:

Adults	1.00 mg.	Children (1-5 incl.) . . .	0.50 mg.
Infants	0.25 mg.	Children (6-11 incl.) . . .	0.75 mg.

The Food and Nutrition Board of the National Research Council recommends the following dietary intake of thiamine for healthy persons in the U. S. A.

Recommended Daily Intake in Milligrams

Age	Men	Women
25	1.6	1.2
45	1.5	1.1
65	1.3	1.0
Pregnant (3rd trimester)	1.5	
Lactating	1.5	

The Council recommendations for infants and children vary below and above these figures, based on age and sex. Various illnesses and stress situations can exhaust vital reserves of thiamine. So, for the physician, vitamin B₁ is prepared in various dosage forms and potencies for therapeutic and prophylactic use.

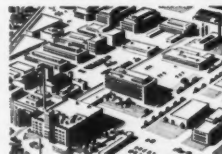


How do human beings receive thiamine? It is widely distributed in foods of animal and vegetable origin, particularly cereal grains and dry legumes. Because of public demand for refined products which millers must meet for obvious economic reasons, a loss of thiamine and other factors occurs during processing. The thiamine loss is overcome through the use of *enrichment* in cereal grain products for which Federal Standards exist, or in other foods such as breakfast cereals, by *fortification* or *restoration*. When enriching, fortifying or restoring, the food processor adds the necessary amount of pure thiamine (and other vitamins and minerals) to the food so that the finished product meets Federal, state and territorial requirements or contributes to the consumer an amount of the vitamin which dietary experts believe significantly useful.



Thiamine is extensively used for the enrichment of cereal grain foods such as white flour, white bread and rolls, macaroni products, farina, corn grits and meal, milled white rice. The story of these uses is delightfully told in a separate brochure which is available on request for reference or educational purposes.

Production. Huge production facilities at the Hoffmann-La Roche plant in Nutley, New Jersey, deliver highest quality thiamine by the tons. Roche manufactures thiamine hydrochloride and thiamine mononitrate. These fine products, which equal or exceed U.S.P. specifications, are ideal for use by pharmaceutical makers and food processors. Years of experience in research and manufacture have made Roche the leader in vitamins.



This article is published in the interests of pharmaceutical manufacturers, and of food processors who make their good foods better with essential, health-giving vitamin B₁. Reprints of this and others in the series are available on request. Write the Vitamin Division, Hoffmann-La Roche Inc., Nutley 10, New Jersey. In Canada: Hoffmann-La Roche Ltd., 286 St. Paul Street, West; Montreal, Quebec.

IMPORTANT NEWS

For the makers and users of Northwestern Spring Flours and Canadian Flours, for all research chemists in flour mills and large bakeries, and for all research engineers engaged in developing better mixing equipment.

ANNOUNCING...

THE RESEARCH MODEL FARINOGRAPH

equipped with a speed-adjusting potentiometer, electronically controlled, which makes possible the use of compensating currents (feed-back of electric currents) to supply the dynamometer of the FARINOGRAPH at all times with the proper required current volume.

These electronic controls guarantee that the Research Model FARINOGRAPH will maintain, uniformly, any speed it is set for, between 10 r.p.m. and 90 r.p.m., regardless of the everchanging load factor of the dough during mixing. Any desired speed changes are obtained simply and instantaneously by turning a dial.

Here is an example of the application of the Research Model FARINOGRAPH:

FARINOGRAPH curves of Northwestern Spring Flours and of Canadian Flours have often been difficult to interpret because they would be flat and would not show the "Peak" generally observed in the curves of Southwestern Winter Wheat flours. However, these same flours, mixed in the Research Model FARINOGRAPH at a speed of 75 r.p.m., will show a decided "Peak" and make curves that are easy to interpret.

The Research Model FARINOGRAPH
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CEREAL SCIENCE

Today

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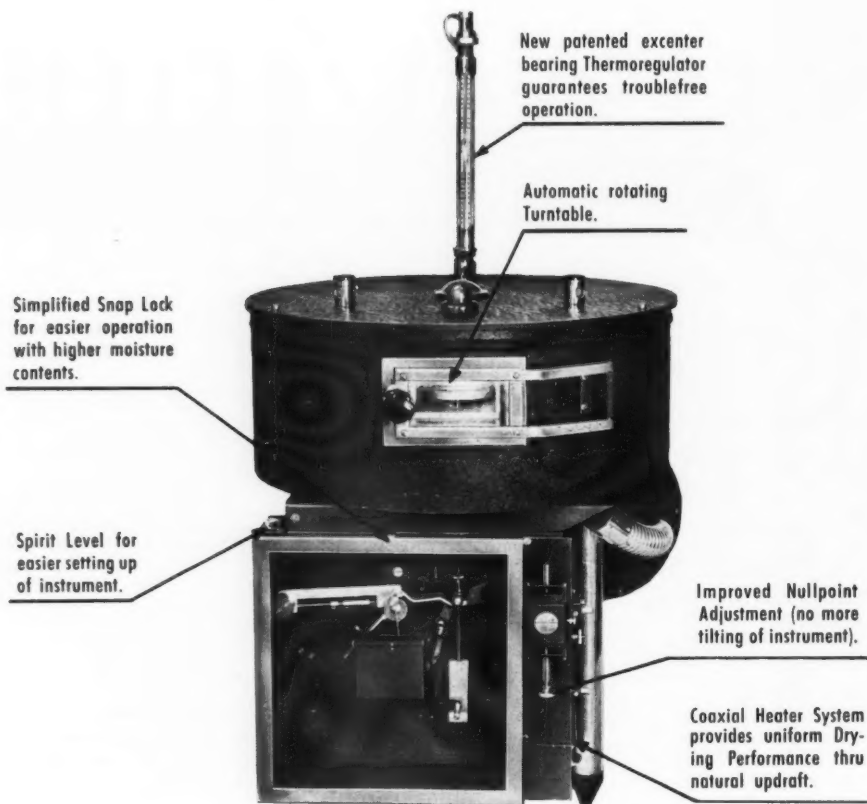
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IN AN EARLIER issue of *Cereal Science Today* an editorial stressed the close relationship of cereal chemistry and cereal technology. This thought may well be expanded to include the areas of production and consumption.

In view of the rapidly changing technological and scientific procedures in agricultural production, and our better understanding of factors influencing consumer acceptance, it is imperative today that cereal chemists and technologists attain some perspective of these areas. The important factors of production relate not only to location, variety, soil, climate, and season but also to the various aspects of application of chemicals and use of new types of equipment. Naturally it is also important that they keep in mind factors that influence consumer acceptance and the idea that these may very well be related to some of the dramatic changes in production procedures as well as technology or chemical treatment during preparation.

On the other hand, it is more important than ever that those concerned with production should be aware of some of the problems confronting cereal chemists and technologists, not only problems relating to processing, storage, and distribution, but also those relating to consumer acceptance.

Unfortunately it has been common rather than uncommon for production people to direct their thinking entirely toward tons and yield rather than quality or the influence production procedures may have on processing and consumer acceptability. In present-day operation, the agronomist, horticulturist, plant pathologist, entomologist and, above all, agricultural extension agents must be led to realize that what they do may very well affect the feasibility of technological processes and eventually consumer acceptance. The extension specialist should be encouraged to maintain the inquisitive mind to the extent that he will wonder, for example, if a trace of benzene hexachloride on a cucumber seed will or will not affect the taste of the pickled cucumber — as well it does. He should also maintain the inquisitive mind regarding chemicals or any new production procedure, from planting to harvest and storage, and their possible effect on subsequent processing procedures and consumer acceptance. Such possibilities occur throughout agriculture and there is no reason to believe that cereal grains should be excluded. Yet people in and near production tend to ignore this important full-spectrum thinking. Certainly it is something we need to cultivate, for if we don't we may well find ourselves confronted not merely with surpluses but with inedible surpluses.

EMIL M. MRAK
University of California



For the opportunity to learn, for the chance to relax, one of the world's truly great cities and the Northern California Section bid you . . .

WELCOME TO SAN FRANCISCO

ON SUNDAY, MAY 19, 1957, A.A.C.C. members and friends from Maine to California and overseas will be residing temporarily in the Sheraton-Palace Hotel in San Francisco. On that date the four-day annual meeting will begin.

For most members, preparation for the annual meeting consists only of arranging for hotel accommodations and travel connections; but some members have been working for months to make the 1957 meeting an outstanding event.

Ludvig Reimers, of General Mills in San Francisco, is Local Arrangements chairman. He and his committee are responsible for preparing adequate physical facilities for the meeting, and arranging for the many social events.

Dale Mecham, of the Western Utilization Research Branch, Albany, California, is technical program chairman. His six committeemen set up the technical program with adequate emphasis upon each specialization in the cereal field.

The members of the sponsoring local section — Northern California — perform the numerous miscellaneous tasks. They are aided by the two other West Coast sections, the Southern California and the Pacific Northwest.

But during the meeting most of you will also be busy, making those personal contacts which you like to make year after year. Nevertheless, nearly everyone will have some time to act like a tourist. Assuming you are one of these, here are some of the places you and your wife may go, and some of the things you may do.

As you will be staying in the Sheraton-Palace Hotel, in downtown San Francisco, you should know what every San Franciscan knows, and that is the Palace is the world's finest — and few visitors dispute the contention.

If you arrive by car, you may park two blocks away from the hotel in Union Square, the world's largest underground parking lot. Its four levels have a capacity of 2000 automobiles.

San Francisco Sights

If you decide on a sightseeing tour sometime during the week, you could begin near the hotel. In fact, just across the street, on the corner of Market and Montgomery Streets, stands the Nevada Bank Building which houses the Wells Fargo Bank and Union Trust Company, direct descendant of the famous Wells Fargo Company. The Bank maintains a Wild West Museum on the ground floor,

free to the public. In the collection are the gold spike that was used to connect the tracks of the Union Pacific and Central Pacific when they met at Promontory Point, Utah, in 1869; a photograph of James Wilson Marshall, the man whose discovery of gold started the California Gold Rush; and a gleaming red stagecoach that once traveled the route across the Sierra Nevada Range from Hangtown, California, to Carson City, Nevada.

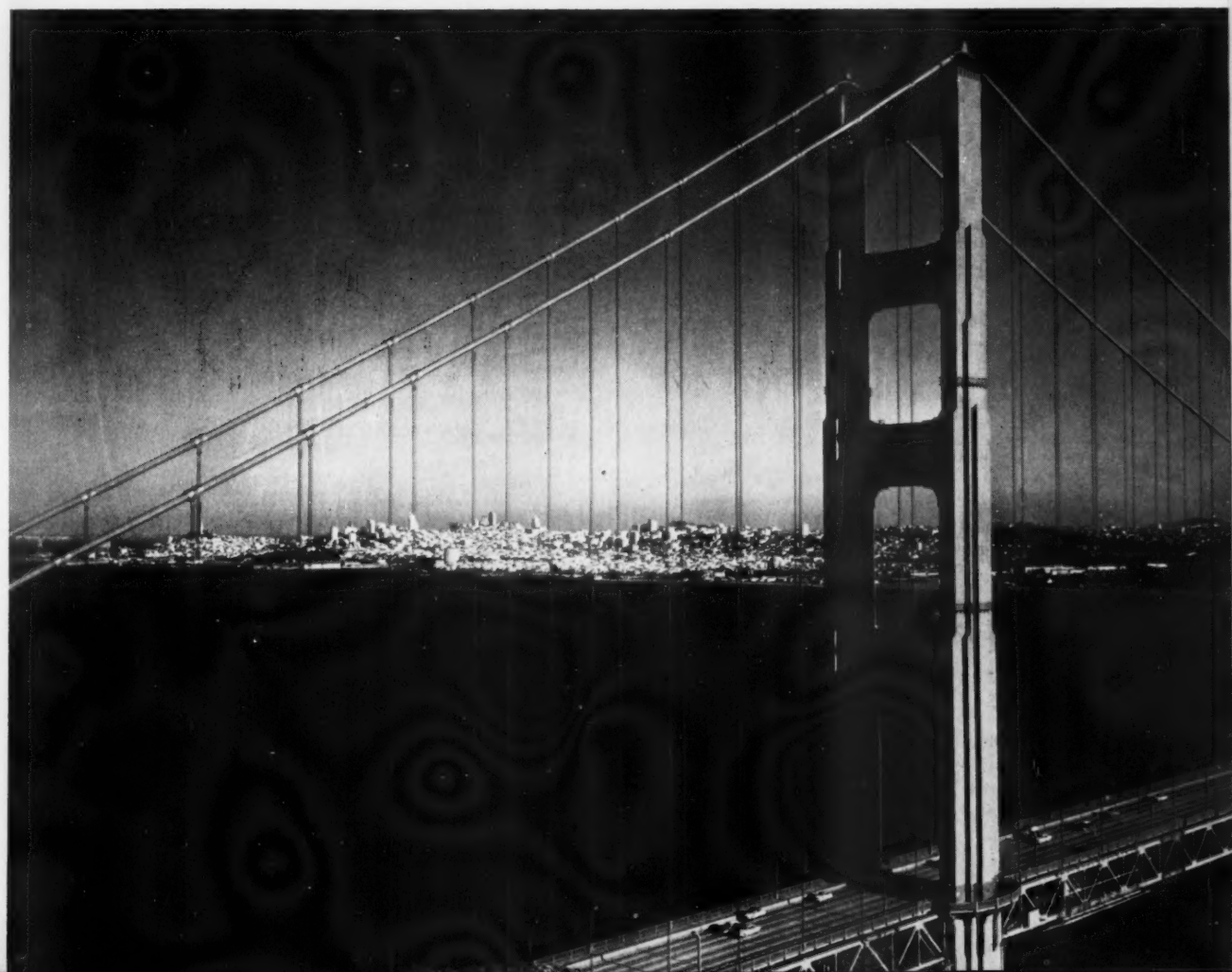
The largest Chinese settlement outside China, called Chinatown, is only three blocks from the Nevada Bank Building. Walking or driving down Grant Avenue, the main street, you would see dragons, lanterns, filigrees and Oriental symbols, balconies painted in bright colors, and pagoda-shaped towers atop many of the buildings. And you probably would find much that interests you in the apothecary shops and bazaars.

Only a block from Chinatown, on Post Street, is the treasure house of Oriental art that is S. & G. Gump and Company. Its collections of jade, china, textiles, tapestries, sculpture, and other art objects are among the most valuable in the world; and the ladies will be impressed with Gump's jewelry designs and bags and scarves of rare fabrics.

If you are a pet fancier you may want to walk another block to Robison's, "The House of Pets," on Maiden Lane. Robison's was featured in the Saturday Evening Post as "America's Oldest and Most Fabulous Pet Emporium." You will find birds and fish from all over the world there, and many unusual dog specimens.

The world famous floral shop of Podesta and Baldocchi, like Robison's, is in the "Mayfair Section" of town. Its window displays are fantastic arrangements of orchids, lilies, camellias and other choice blooms.

The beautiful Golden Gate bridge, San Francisco's trademark, spans the so-called Golden Gate, the corridor of water between the Pacific Ocean and San Francisco Bay. It connects Frisco and suburban Marin County and is recognized by experts as one of the marvels of modern engineering.





Telegraph Hill, as seen from Nob Hill, is the center of the Latin Quarter. The DiMaggio boys played baseball on a playground near there. Dominating the hill is 210 foot high Coit Tower.

By now, you would be only a block or so from Powell Street and the Powell Street cable car. This is the ancient vehicle which has become an institution in San Francisco; so you may wish to perform the sacred rite and take a ride. At the top of the big hill, on Market Street, you may even be inspired to help the conductor and passengers rotate the car on its turntable for the return trip down Powell Street.

You may wish to continue up Market Street, however, to San Fran-

cisco's Civic Center, one of the finest in the United States, on Van Ness Avenue. The City Hall occupies two square blocks. The United Nations' Charter was signed at the Veterans' War Memorial building. The Civic Auditorium has a seating capacity of 12,000. Besides other Federal, State and local buildings, the Center comprises the Opera House and the Public Library.

Now would be the time to see Nob Hill, and its famous homes. Before the great fire of 1906, which de-

stroyed all the homes except one, Robert Louis Stevenson called Nob Hill "The hill of palaces." It is still the hill of palaces. One of the prize adornments is the 19-story Mark Hopkins Hotel. The view of the city from its penthouse cocktail lounge—"The Top of the Mark"—has become world renowned. Life magazine printed a full page color picture of the view from The Top of the Mark in its feature on the recent Republican convention in San Francisco.

Tourist Attractions Outside Frisco

If you wish to branch out from downtown San Francisco to see some of the more distant attractions, you might begin with Fisherman's Wharf, at the Bay end of Mason Street. There you could watch fishermen mending nets and unloading live crabs from tiny seagoing vessels. And, out in the Bay, you could see Alcatraz, the escape-proof Federal Penitentiary called "The Rock."

If you follow the street named The Embarcadero along the Bay toward Market Street, you will come to the San Francisco—Oakland Bay Bridge, the longest in the world. On the opposite side are the cities of Oakland, third largest in California, and Berkeley, location of the 571-acre campus of the University of California, which boasts the world's largest enrollment. Mount Diablo Boulevard leads to mighty Mount Diablo, in 2000-acre Mount Diablo State Park. From its summit you can view an area of land and sea half again as large as New York State.

After crossing the Richmond—San Rafael Bridge, north of Berkeley, you would be in Marin County. There you would find picturesque, hillside clinging homes, where residents garage their cars in their attics; forbidding San Quentin Prison, seen from the highway just south of San Rafael; Mt. Tamalpais, from the top of which you can see San Francisco, across the Bay; and Muir Woods, named after the naturalist, John Muir, with its stand of ancient and lofty redwood trees.

To return to San Francisco now, you would cross the Golden Gate bridge, trademark of San Francisco and the most beautiful bridge in the world. As you leave it, you will enter the Presidio. The Presidio was the headquarters for the soldiers of Charles III of Spain and the Mexican colonists. It is still a military post.

At Fisherman's Wharf tourists may watch fishermen unloading live crabs after daily fishing trips, and order a meal of freshly caught seafood which will be cooked in sidewalk cauldrons.



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The Garden Court of the Sheraton-Palace hotel affords a good view of the hotel's glass roof, crystal chandeliers, and stained glass windows. It is said that when one awakes after a night's rest in the Palace, he will not have to think twice to realize he is in San Francisco.

The officers' club occupies an adobe structure which was the first building in San Francisco.

Following Park Presidio Boulevard, you would soon enter Golden Gate Park. Here, birds, animals, and flowers abound in 1000 acres of woodland. Within the Park are two Dutch windmills, museums, an aquarium, conservatory, aviary, several lakes for boating and fly-casting, and Kezar Stadium, where the 1956 east-west Shrine football game was played.

After the Park you may wish to visit Mission Dolores, one of the best known tourist landmarks in San Francisco. The Mission was founded in 1776 by Franciscan Friars. The rafters were painted by Indian converts nearly 150 years ago, and the altar was brought from Spain. Many pioneers who made early San Francisco history lie in the graveyard beside the Mission.

Restaurants

After a day of sightseeing, or annual meeting activity, supper at one of San Francisco's 3500 restaurants, some of them world famous, would prove satisfying, indeed. You might relish Polynesian food, so Trader Vic's, 20 Cosmo Place, or Skipper Kent's, 1040 Columbus Avenue, would be the places to go. Trader Vic has gained his reputation with his rum drinks which bear such alluring names as Trader Vic's Passion Cocktail, Caribbean Hot Swizzles, and Scorpion. Skipper Kent features oyster filet mignon, Java lobster curry, celestial chicken, and mandarin duck.

If you want to experiment with Japanese food, it is likely you will go to Tokyo Sukiyaki on Fisherman's Wharf. Kimono clad girls serve authentic Japanese dishes in an authentic Japanese setting, while you gaze out over San Francisco Bay, San

Francisco hills, and the fishing fleet.

However, if you favor Shish Kebab and Yaprak Sarma, you will want to try Omar Khayyam's Armenian restaurant at 196 O'Farrell.

Jack's Restaurant at 615 Sacramento Street is unexcelled for French food. Jack's specialties are Chicken Jerusalem and Sole Marguery. But strictly continental food is the fare at El Prado in the Plaza Hotel, Post and Stockton Streets.

German food and Bohemian atmosphere attract customers to telegraph hill and The Shadows, 1349 Montgomery, in the center of the artists' and writers' colony.

Valhalla Inn, 201 Bridgeway, serves American style dishes. Affable Sally Stanford, parrot perched on her shoulder, presides over the always crowded atmosphere.

Finally, it is likely you will want to eat at a Chinatown restaurant. Nam Yuen's, 740 Washington Ave. (Please turn to page 36)

NOW: INSECTS
ELIMINATED
WITH A
NEW, PRACTICAL

Gamma Irradiation Facility

By L. E. Brownell *

FOR ONLY ONE-FIFTIETH of a cent per 100-pound sack, flour mills can eliminate all insects and eggs from flour, and make food products more resistant to deterioration and spoilage.

How? Milling industry people are well acquainted with the method—ionizing radiation. The Engineering Research Institute of the University of Michigan has adapted this method to the design of a minimal-cost gamma irradiation facility that is completely practical and can be constructed in the basement of an existing structure.

This operation promises to solve the problem of insect infestation which continually confronts milling companies and inflicts an annual loss of \$300,000,000 in flour, grains, and cereal products.¹

Screening, the most commonly used eradication process, removes insects from grain or flour but seldom removes all their eggs. Under favorable conditions, eggs of the confused flour beetle (the insect most frequently found in flour after it leaves the mill) may develop into adult beetles in 30 days. The female beetle may live for more than a year and produce 400 to 500 eggs. Considering the short egg-to-adult period, such reproduction may result in complete infestation of stored flour. Accordingly, screening is less than adequate. Chemical fumigation also may destroy larval or adult insects but not the eggs, and results may be the same as with screening.

Gamma irradiation, on the other hand, is totally effective. With an irradiation facility such as the one de-

signed at the University of Michigan, a dosage of 10,000 rep² is considered sufficient, but a 25,000-rep dosage is recommended to provide some margin of assurance of egg and insect sterility in screened flour.

Chamber Design

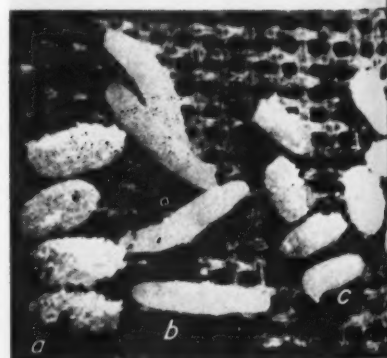
The gamma irradiation chamber designed by the Engineering Research Institute can be constructed in the basement of an existing structure, the walls and earth forming part of the shielding. It is approximately 35 feet long, 16 feet wide, and 22 feet high. A well 18 feet deep, extending below the floor of the radiation chamber, is used for underwater replacement of the spent radiation source. Ordinary concrete building slabs, stacked without mortar, comprise most of the construction material. Entrance to and exit from the chamber is afforded by a concrete stepped plug in the roof. This opening can be used by maintenance personnel working inside the chamber and for access to the radiation chamber.

The radiation facility is designed to be an integral part of an over-all manufacturing operation, situated so that flour, after bagging, can easily be conveyed to the entrance of the chamber and introduced into a bucket conveyor which transports it through the chamber, exposing it to radiation on the way.

The product (such as flour or grain) is brought from the packaging operation (see diagram) by conveyor *A* around sprocket *B* and transfer-loaded at *C* to the chamber bucket conveyor, which lowers the buckets through an opening in the floor, *D*, to the access passageway of the cham-

ber. After a 90-degree bend around sprocket *E*, the conveyor progresses to the first barrier wall, *F*, then makes two 90-degree bends around sprockets *G* and *H*, and travels into the chamber past the second barrier wall, *I*. It then makes a first pass through the chamber under the radiation source, *J*, becomes an elevator as it makes a 90-degree bend around sprocket *L*, and after traveling around sprocket *M*

Top: The confused flour beetle, about one-seventh of an inch long. Bottom: Eggs of flour and grain insects shown resting on a piece of 10XX bolting cloth; (a), Broad-horned flour beetle; (b), cadelle; (c), Mediterranean flour moth; (d), confused flour beetle. All greatly enlarged.



* Supervisor, Fission Products Laboratory, Engineering Research Institute, University of Michigan, Ann Arbor.

¹ Cotton, R. T. *Insect pests of stored grain and grain products*, p. 1. Burgess Pub. Co.: Minneapolis, Minnesota (1952).

² An abbreviation for the term roentgen-equivalent-physical. It is a unit of dosage, or quantity of radiation, and may be regarded as equivalent to the roentgen.

again passes the radiation source, *J*, and barrier wall, *I*; it makes two 90-degree bends around sprockets *N* and *O*, and subsequently travels around sprockets *P*, *Q*, *R*, and *S*. The buckets are dumped at *T* and the sacks of flour or grain slide down ramp *U* to belt conveyor *V*, which removes them to a shipping or storage area.

very high gamma activity but decay rapidly. For economical operation of a radiation facility, the elements would be replaced approximately every two months. During this interval conveyor speed would be adjusted to compensate for radioactive decay.

In the interest of uniformity of the radiation field and resultant uniform

the facility was designed primarily for killing insects and eggs in flour packaged in 100-pound bags, similar-sized bags of meal, mash, and other cereal products might be treated.

No Undesirable Effects

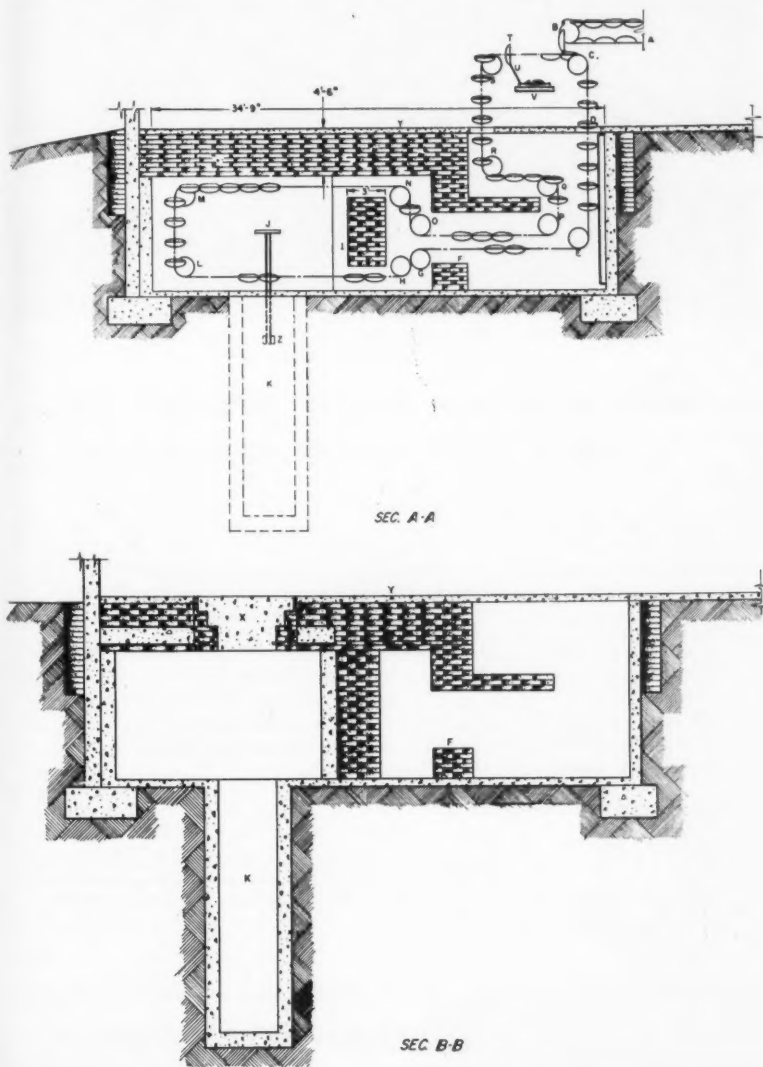
Before the Engineering Research Institute began its investigation, there was some question whether irradiation would adversely affect flour or finished baked goods. It was found that low dosages of irradiation, sufficient for control of insect infestation, did not change cake flour, all-purpose flour, or bread flour in any way. Nor did such dosages of radiation affect the quality of finished baked goods. However, when high dosages were applied, the effects were definitely undesirable. Bread was oversweet, heavier, more compact, and gummier, and had a darker yellow crumb color. Biscuits were drier and gummier and their flavor was changed.

There has been public apprehension over rumors that treatment of food such as flour with ionizing radiation would make it radioactive. There is no basis for such fears. If neutrons were used for treatment, they might induce radioactivity. But since neutron radiation is not produced by the gamma radiation sources and accelerated electrons (cathode rays), the danger of induced radioactivity in foods is nonexistent, both theoretically and experimentally. Gamma and cathode rays of the energies being considered cannot induce radioactivity in the elements found in food.

Moreover, since the Food and Drug Administration regulates the use of any new process, food processors will not market a product without definite proof of its wholesomeness. These facts are sufficient to make certain that no unsafe foods reach the market.

Cost of the Chamber

Cost of construction and operation of the irradiation facility described herein is the lowest of seven different designs of commercial radiation facilities considered by the author and his colleagues. Building cost is estimated at \$38,320, including \$3,484 for contractor's fee and \$2,100 for engineering costs. An estimated maximum annual operating cost of \$42,240 includes \$10,200 for shipping, han-



Radiation Source

Because of current unavailability of fission products in a form suitable for industrial use, cooling or "spent" reactor fuel elements are recommended as sources of radiation. In chemical processing plants, these fuel elements are stored under water for several weeks before processing. Their use as radiation source in a gamma radiation facility would partially defray the cost of this storage.

Cooling reactor fuel elements have

dosage, the chamber could use two reactor fuel elements instead of one, spaced at predetermined distances from each other and the axis of the conveyor. The length and width of the the conveyor buckets could be limited.

The capacity of the radiation chamber is 27 tons of flour per hour. A 100-pound bag of flour receives the specified radiation dose in 14.58 seconds, with the conveyor belt traveling 14 feet per minute. Although

dling, and rental of the fuel elements, plus allowances for taxes, insurance, and interest on investment.

On the basis of chamber operation for 260 days per year with one 8-hour shift per day, and plant amortization over a 10-year period, the cost of irradiation is estimated at \$0.0373 per 100-pound sack. However, with three shifts it should be feasible to reduce this to less than \$0.0002 (one-fiftieth of a cent) per 100-pound sack. Another cost reduction might be in increasing capacity by increasing the radiation intensity; that is, using four, six, or eight fuel elements rather than two. The limit would be determined primarily by the handling capacity of the flour mill.

Other Uses for the Facility

A chamber of similar design conceivably could perform many other important functions. While a dosage of 25,000 rep will not destroy enough microorganisms in fresh foods to affect storage life appreciably, nevertheless it will inhibit sprouting in potatoes and onions; it will sterilize insects infesting grain and cereal products; and it will sterilize eggs and larvae of the Mexican fruit fly in fruit from infested areas, thereby preventing spread of the infestation. Also, a dosage of this size will break the life cycle of trichinosis in pork and will control tapeworm in beef, pork, and fish, and a number of parasitic diseases. Several types of food, including some tropical fruits, currently banned as U. S. imports because of possible insect infestation, could be imported if sterilized by an irradiation facility such as that described here.

In addition, the U. S. Government reports that radiopasteurizing³ amounts of radiation (about 100,000 rep) can extend the refrigerated storage life of beefsteak, lamb, fish, and tomatoes 5 to 10 times and lengthen the refrigerated shelf life of some two dozen food items without a major change in flavor or odor.

All in all, this facility represents the simplest and cheapest design that has yet been conceived for commercial gamma irradiation of food items on a continuous basis.

³ Radiopasteurization as used in irradiation means a dosage less than that required for complete sterilization. Most, but not all, of the microorganisms are destroyed.



The William Kelly Milling Company of Hutchinson, Kansas, which has a daily capacity of 5000 cwt.

WHY WILLIAM KELLY MILLING CO. USES W&T FLOUR TREATMENT

The William Kelly Milling Company, with fifty years of experience, knows that the best grade of flour requires precise and uniform treatment methods. Because of this knowledge, they insure that their flour is uniformly aged, and of the best color, by using Wallace & Tiernan flour treatment. This includes: Dyox® for maturing; a Beta Chloral® unit for conditioning; and Novadelox® for bleaching. In addition, the William Kelly Milling Co. has available, at all times, skilled and experienced technical assistance from Wallace & Tiernan to aid them in the solution of their flour processing problems.

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**FACTORS AND
CONSIDERATIONS OF
IMPORTANCE IN**

Designing Feed Supplements

By John F. Mahoney and William L. Benson*

WITH OUR INCREASING knowledge concerning the nutrition and diseases of poultry and other livestock, it has become general practice to fortify most manufactured feeds with vitamins and minerals and in many cases with drugs to control or prevent diseases.

These fortifying agents are used in such extremely small quantities that they are sometimes called microingredients. Vitamin B₁₂, for example, might be added to a ton of feed in as minute a quantity as 5 mg., a dilution of about one part in one billion. If such microingredients were added in concentrated state directly to the feed, uniform distribution would be impossible in commercial mill practice. The problem becomes even greater when ten, fifteen, or even twenty of these ingredients are added to an individual feed.

Most feed mills, during the course of a day, produce a variety of feeds for different purposes, all differing in microingredients. To weigh each of these ingredients separately for each batch of feed would be laborious and the results would be seriously open to error.

The manufacturer of microingredients supplies his products to the feed manufacturer in diluted forms of standardized activity called feed supplements. There is an increasing tendency toward combinations of 10 or even 15 microingredients in one supplement, in such proportions as to meet individual needs. These supplements may be further packaged in small units of suitable size so that one bag of supplement is the right amount for a batch of feed.

Factors needing the most careful consideration in preparing multicom-

ponent feed supplements are the stability and compatibility of various ingredients; mixing practices and procedures; and a proper balance of physical properties.

Stability and Compatibility

It is of prime importance that the guaranteed amount of each microingredient be present in the feed supplement at the time of use. In commercial practice it is seldom possible for the feed manufacturer to analyze for each ingredient in every bag of supplement, and time rarely permits thorough analysis of the formulated feed before it is sold and used. For a supplement containing the proper quantities of the various microingredients as stated on the label, the feed manufacturer must, therefore, depend upon the supplier and

his thorough knowledge of the stability and compatibility of each microingredient.

Certain ingredients are substantially stable and compatible with one another in supplements under all likely conditions of storage and use. These include riboflavin, niacin, choline chloride, streptomycin, arsanilic acid, 3-nitro-4-hydroxyphenylarsonic acid, methionine, stilbestrol, sulfaquinoxaline, nicarbazin, and of course the minerals—manganese, iron, cobalt, and copper, in the form of their common salts. The stability of other ingredients, however, may depend upon the manner in which they are used.

Most of the vitamin A used in manufactured feeds is not involved in supplement formulations but is added directly to the feed in the form of a

Authors Mahoney (left) and Benson (right) confer on a vitamin mixture about to be marketed.



* Chemical Division, Merck & Co., Rahway, N. J.

vitamin A, or vitamin A and D, feeding oil. Several solid forms of vitamin A are commercially available, however, and are used in supplements. These vary in composition from simple absorbates of vitamin A oil on a solid carrier to particles of vitamin A surrounded by a resistant coating. They differ widely in stability. In general, a high moisture content in the supplement, minerals (particularly manganese), and menadione have a deleterious effect upon stability of vitamin A.

Solid forms of vitamin D are also commercially available for use in supplements; these too will vary considerably in stability, although in general, vitamin D appears to be less sensitive to oxidative destruction than vitamin A. One commercial product is substantially stable in the presence of minerals and in feed supplements for at least 8 months.

Calcium pantothenate has maximum stability between pH 6 and pH 8; decomposition may occur in supplements containing acid ingredients, such as niacin, arsanilic acid, and 3-nitro-4-hydroxyphenylarsonic acid. The calcium chloride complex of calcium pantothenate which was made commercially available in 1955 is distinctly more stable than ordinary calcium pantothenate under acid conditions, probably because of its reduced solubility in water. Other formulation techniques are available which can ensure complete stability of calcium pantothenate in feed supplements under all likely conditions of use.

Procaine penicillin varies considerably in stability, both in feed supplements and in feeds², the pharmaceutical grade of procaine penicillin being distinctly unstable. However, a form of procaine penicillin especially designed for feed use is stable under all likely conditions of use.

Menadione is fairly stable under anhydrous conditions, but undergoes gradual decomposition in grain-based supplements to the extent of about 10 to 15% per month of storage. By use of an adequate overage, the label guarantee for menadione content in a supplement can be maintained, provided the use life of the mixture is limited.

Although in pharmaceutical usage the name vitamin B₁₂ is restricted to cyanocobalamin, this practice is not



Equipment used in the determination of B₁₂ in feed supplements by the isotope dilution method.

followed in the feed trade; and various derivatives of cobalamin, including naturally occurring mixtures, may be marketed as vitamin B₁₂ supplements. Some of the cobalamin derivatives appear to be quite unstable to storage. Cyanocobalamin itself, and nitritocobalamin show a high degree of stability in feed supplement formulations.

Mixing Practices

Despite the care which may go into the design and formulation of a feed supplement, full value will not be obtained by the feed manufacturer unless the supplement is incorporated quantitatively and uniformly in the feed. Moreover the manufacturer must guarantee the amount of drugs in medicated feed, through a statement on the tag.

Although much may be done, through proper designing of supplements, to facilitate their satisfactory incorporation in the feed, good mixing practices are essential. It is generally advisable to avoid adding the supplement directly to the feed; instead, a premix consisting of one part of the supplement to 10 to 50 parts of a suitable feed ingredient is added along with the major components to produce the finished feed. Ground corn meal, a common feed ingredient, is an excellent carrier for premixes; another suitable one is wheat middlings.

Care must be taken, in adding the

supplement to the feed, that the draft from the dust collector is reduced to the point where it does not strip powder out of the premix. In one mill it was found that 15% of one of the microingredients being charged in the form of a dilute premix was pulled into the dust collector. Although this dust was automatically returned to the blender, the time lag was so great that probably not more than a fraction of it was returned to the batch from which it originated.

Large feed mills have automatic equipment for conveying the mixed feed into storage bins and weighing hoppers. A small amount of feed is always retained in the equipment

Small batches of feed supplements are conveniently prepared with the laboratory blender.



² Hollenbeck, Danner, and Mahoney. *Poultry Sci.* 33: 425 (1954).

from the previous batch, diluting the first portion of a new mixture passing through. Some physical segregation also may occur in handling feed, so that the composition of the last few bags coming out of the weighing hopper is not representative of the entire batch. This causes no serious problem so long as successive batches of the same formulation are being produced, but in shifting production from one type of feed to another, suitable precautions must be taken: the first several bags of the new run and the last few bags of the prior run are set aside for blending in some later production of similar composition. The amount of the set-off will vary, and should be established for the individual mill, using as a guide the level of an ingredient for which sensitive methods of analysis are available.

Balance of Physical Properties Important

A proper balance in physical properties is essential in producing a supplement which is uniform and will remain so under severe shipping and handling conditions, and which can readily be incorporated by way of a premix in the finished feed. Most supplements are prepared by a dry-mixing procedure, since this method is relatively inexpensive and requires only standard equipment. A general procedure consists of 1) dry blending of the various components with the diluent until the mixture is relatively uniform, 2) passage of this mixture through a mill to break up lumps and ensure intimate contact of the powdered ingredients with the coarser carrier, and 3) a second mixing to produce the finished supplement.

Under certain conditions a wet-mixing procedure is used for the entire supplement or one of the important components. For example, a solution of the active ingredient may be absorbed on a coarse carrier, followed by drying and grinding of the product to suitable particle size. Or, a suspension of the active ingredient may be applied as a coating on the surface of the insoluble carrier, with a soluble adhesive used as a binder.

Wet-process techniques for preparing feed supplements are more expensive than dry mixing and may require special equipment. They are of particular value when the concentration of active ingredients is high, when ingredients are hygroscopic or incompatible, or when close control

over particle size or shape of the supplement is needed.

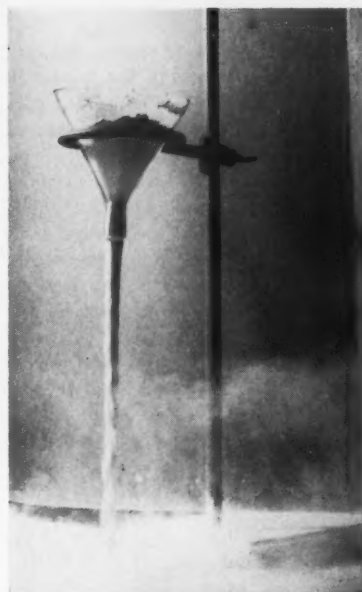
Whether wet- or dry-processing techniques are employed in the manufacture of the feed supplements, the following physical properties should be considered:

Segregation

No matter how carefully or how thoroughly a supplement is mixed, it will not remain uniform if it is likely to segregate. It may do so if the carrier itself consists of several components with widely different physical properties, or if the particles of the carrier are distributed over too wide a mesh range. A narrow range such as 30 to 80 is recommended.

Active ingredients may segregate if the supplement contains too high a proportion of powder. Each carrier appears to have its own tolerance for powders. With a 30- to 80-mesh range, corn distiller's dried grains has a powder capacity of about 25%, wheat standard middlings about 20%, and oyster-shell meal only about 5%. If the carrier itself contains a high proportion of fines, this will, of course, decrease its ability to hold on to active ingredients in powder form.

Some ingredients in feed supplements, usually fine powders which are highly insoluble in water, tend to develop electrostatic charges and may adhere to nonconducting equipment such as fiber or paper containers, plastic, glass, or wooden utensils. This



Dustiness of the feed supplement may be estimated by allowing the stream to flow through a strong horizontal current. Both the amount and composition with the fraction removed as dust are important.

tendency can frequently be reduced by applying a small quantity of surface-active agent or humectant to the surface of the active ingredient. Lowering the concentration of the ingredient in the supplement also helps, and as a final effort most electrostatic problems can be solved by resorting to a wet process for preparing the supplement.

Volumetric feeder used to measure the flow characteristics of feed supplements.



Dustiness

Undue dustiness of supplements not only is a nuisance to the feed mill operator who handles them, but may lead to a loss to the dust collector of active ingredients in the premix and finished feed. Where control over the form of the active ingredient is possible, dustiness can be reduced or practically eliminated by increasing the particle size of the active ingredient. It is also helpful to decrease the quantity of the offending active ingredients in the supplement, and to use selected carriers with a high powder-retaining capacity. A wet-process technique for preparing the supplement is very effective.

Flow

In the manufacture of feeds by the continuous process, supplements are usually added directly to the conveyor line by a proportioning machine, and the supplement must pass through this machine freely, without bridging or clogging. The proper carrier can do much to improve the free-flowing properties of the supplement, although it should be pointed out that along with this effect, dusting and segregating of the supplement may be increased. So-called free-flowing agents, added in quantities up to about 5%, are frequently very effective. Some of the more common of these agents include calcium silicate, silica gel, calcium phosphate, and talc.



Speed and ease of flow of feed supplements through orifices are used to judge flow properties and tendency to bridge.

Caking and Packing

Supplements containing hygroscopic ingredients, or ingredients with a low melting point, may tend to develop hard cakes upon storage. Unless these cakes are broken up they may survive the mixing treatment in the feed mill and appear as lumps of active ingredients in the finished product. With choline chloride, the best solution to this problem seems to lie in the use of a wet-processing technique for preparing the supplement. Frequently the addition of small quantities of free-flowing agents, such as calcium stearate, silica gel, and the like, will decrease caking tendencies. Where hygroscopic ingredients are involved, care must be taken to package the supplement in a container with a low degree of moisture transfer.

By "packing" is meant the tendency of the supplement to decrease in apparent bulk during handling and shipment, forming relatively soft and easily friable lumps. Packing is particularly a problem in the continuous manufacture of feeds, since it may seriously affect the rate of flow of the supplement through the proportioning feeders. The tendency to pack can be alleviated by choosing the proper carrier and reducing the concentration of active ingredients.

Particle Size and Density

Results are best if the supplement is similar in particle size and density to the feed into which it is to be incorporated. It has been our experience that feed mill performance is good with supplements, all of which pass 20 mesh, most of which pass 40 mesh, and a minimum of which pass 200 mesh. Results have been satisfactory with supplements weighing from 25 to 75 lbs. per cu. ft., although a bulk close to 35 lbs. per cu. ft. is preferred. If grain carriers are used in preparing supplements by dry-mixing techniques, bulk is usually not a problem.

Summary

Along with the increased use of microingredients in manufactured feeds during the past several years, various feed supplements have been developed, containing from one to perhaps fifteen active ingredients, custom-prepared according to the feed manufacturer's individual require-

ments. Essential in the preparation of these supplements is a thorough knowledge of the stability and compatibility of the microingredients, as well as consideration of a number of important physical properties. Provided good feed manufacturing practices are followed, proper formulation of the supplement can do much to ensure that microingredients are blended into feeds uniformly and quantitatively.

San Francisco:

(Continued from page 29)

nue, won the 1954-55 Holiday Magazine award for its authentic Cantonese food.

Night Spots

An evening at one of San Francisco's elegant night clubs would cap any visitor's day. Bimbo's 365 might easily top your list of preferred night spots after you have been there. Called the 365 because it is "open 365 days a year," Bimbo's is the home of the "Girl in the Fish Bowl."

The Hungry "I" at 599 Jackson has a Parisian night life atmosphere. It advertises its entertainment as "original, sophisticated, sometimes ribald," and has been featured in Collier's and Holiday magazines.

Widely publicized Charlie Low's Forbidden City, on 363 Sutter, offers five-course Chinese or American dinners, and a thrice-nightly Chinese Revue.

After a successful convention week during which you see some of the sights mentioned here, eat at some of the restaurants, and spend an evening at one of the night spots, you will be ready to return home informed, relaxed, and anxious to return to the city of the Golden Gate.

NEXT MONTH

Preliminary program for the San Francisco meeting. Over 50 technical papers to be presented by title and author.

A.A.C.C.

LOCAL SECTIONS

Correction: The lifetime membership presented by the Pioneer Section in December was given to Mr. Charles Sullivan of Hutchinson, Kansas and not to Mr. C. D. Neill as reported by THIS JOURNAL. Mr. Sullivan has been a national member of the A.A.C.C. since 1926.

Canadian Prairie Section met on January 17 in the Grain Exchange Building, Winnipeg. Speaker at the dinner, held in the Basement Cafeteria of the building, was F. J. Greaney of Line Elevator Farm Service, Winnipeg. Dr. Greaney's subject was commercial agricultural extension activities in the Prairie Provinces.

Niagara Frontier Section met for dinner on January 14 at Erie County Technical Institute. John B. Woerfel, technical representative of Armour & Co., talked to the members on processing and uses of shortenings.

Officers elected for the coming year were Jack Monier, sec.; Bob Van Burek, treas.; J. C. Adourian, F. Wagner, and C. Bronold, executive committee.

Chesapeake Section announced plans for a January 24 meeting at Marty's Restaurant in Baltimore, with Esther F. Phippard of Household Economics Research, U. S. Department of Agriculture, as speaker.

KEL-PAK powders

Five standard formulas are available. All conform to the A.O.A.C. Standard methods.

No. 1 (Kjeldahl Method). Each packet contains 9.9 grams Potassium Sulfate, .08 gram Copper Sulfate, and .41 gram Mercuric Oxide.

No. 2 (Gunning Method). Each packet contains 10 grams Potassium Sulfate and .3 gram Copper Sulfate.

No. 3 (Kjeldahl-Wilfarth-Gunning Method). Each packet contains 9 grams Potassium Sulfate and .35 Mercuric Oxide.

No. 4 Each packet contains 10 grams Potassium Sulfate and .7 gram Mercuric Oxide.

No. 5 Each packet contains 15 grams Potassium Sulfate and .7 gram Mercuric Oxide.

Use one packet per determination.
Minimum shipment is 500 packets. The Powders are not available.

KANSAS CITY

Laboratory Supply Co.

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"Emulsifier"

is not the most stimulating of words

The word "emulsifier" never made anybody hungry. It suggests chemistry and test tubes and great big process kettles, whereas people (even chemists) like to think of either a) Grandma by the pantry whipping up something 'specially delicious or b) *la haute cuisine*, an art form which cares not a fig about the depression of interfacial tension.

It so happens that in foods where fat and non-fat must stay united in appetite-rousing texture, the health of the sales curve usually demands a little something to reduce interfacial tension. We propose *Myverol® Distilled Monoglycerides*.

Monoglycerides have been components of human food since long before there were any chemists. In *distilled monoglycerides* there are big advantages. Because they are virtually straight monoglyceride, unaccompanied by other substances from the reaction mixture in which they are commercially produced, a very small quantity does the emulsifying job. This saves money. There is nothing to affect flavor. There is no residual catalyst to rob you of the very monoglyceride it helped produce.

If you suspect that a product of yours could use help for its stability of texture, we shall be very happy to look into it with you. We make a lot of different kinds of distilled monoglycerides for a lot of different food purposes. Write *Distillation Products Industries*, Rochester 3, N. Y. Sales offices: New York, Chicago, and Memphis • W. M. Gillies and Company, Los Angeles, Portland, and San Francisco • Charles Albert Smith Limited, Montreal and Toronto.

distillers of
monoglycerides
made from
natural fats
and oils



Also . . . vitamins A and E in bulk
for foods and pharmaceuticals

Distillation Products Industries
is a division of **Eastman Kodak Company**

People, (Products), Patter

... People

Charles E. Brockway named head of a research group at A. E. Staley Mfg. Co., Decatur, Ill. **James Dustin** promoted to superintendent of materials and methods department.

Robert M. Farr, formerly president of Huron Milling Co., retires on acquisition of the company by Hercules Powder, but will be available to Hercules in an advisory capacity. **Carl S. Smith**, former vp-manufacturing and research, to be plant manager at Huron.

Recent research staff promotions, Archer-Daniels-Midland Co., Minneapolis: **Marvin W. Formo**, research coordinator, and **Alexander Olotka**, director of resin lab, to assistant research directors; **Louis I. Hansen**, research supervisor, to senior research associate.

Edward L. Fritzberg joins research and development labs of Pillsbury Mills, Minneapolis.

Philip P. Gray, chief chemist at Wallerstein Labs since 1934, elected a vice president of Wallerstein Co., Inc., New York.

E. T. Harding, assistant to general manager of research and development at Corn Products Refining, promoted to coordinator of technical recruiting and placement in the industrial relations department. **Fred J. Holsinger** to replace him.

Charles Glen King, scientific director of Nutrition Foundation, named treasurer of American Public Health Association.

Administrative realignment in American Meat Institute Foundation, necessitated by the death on Sept. 30 of **Henry R. Kraybill**, has placed **Bernard S. Schweigert** as director and **Delbert M. Doty** and **Charles F. Niven, Jr.**, as associate directors of research and education.

New officers of Malting Barley Improvement Association are **A. J.**

LeJeune, director of the Association, succeeding **John H. Parker** who died in October 1956; and **R. L. Upton**, agronomist. New members of the board of directors are **John J. Berger** and **H. G. Kreiner**. Other officers for 1956-57: **Stuart F. Seidl**, pres., **Herbert Kurth** and **J. G. Shakman**, vp's; **Arnold J. Goede**, treas., **Thelma T. Richards**, sec.

John E. McKeen, president and chairman of Chas. Pfizer & Co., named a member of the corporation of Brooklyn Poly.

Richard J. McKiernan appointed chief chemist of Stein, Hall & Co.'s industrial food laboratory.

Bradshaw Mintener, until recently Assistant Secretary, U. S. Department of Health, Education, and Welfare, and formerly vice president and general counsel at Pillsbury Mills, Inc., has joined Blum, Lindsey, and Powell, Washington D.C., as counsel.

Enrico T. Palomba (general manager of Anheuser-Busch, East Brunswick, N. J.) appointed by the Board of Freeholders of Middlesex County, N. J., to serve on the County Sewerage Authority. His appointment was made to retain representation of industry in the Authority, on resignation of another member.

Harold E. Weissler leaves Pearl Brewing Corp. to become assistant technical director of Falstaff Brewing Co., St. Louis.

Robert S. White promoted to production manager, soybean division, Archer-Daniels-Midland Company.

... Products

On the market now is a new Thelco oven, redesigned after two years of research and development by the Wilkens-Anderson Co., Chicago. Features of the new oven are "Black Heat" heating elements, long-life alloy elements operating

at low watt density; all-welded construction; all-aluminum interior; insulation on all six sides; centralized controls within easy reach of the operator. Styling, too, has been modernized to do justice to modern laboratory surroundings.

The Wilkens-Anderson Co., 4525 W. Division St., Chicago 51, Ill., will send a catalog on request.

Of special interest to processors of foods and allied products having stabilization problems is a 4-page folder describing Tenox antioxidants and charting their structural formulas, properties, composition, and popular applications. (Eastman Chemical Products, Inc., subsidiary of Eastman Kodak Co.)

Such products as edible and inedible animal fats, baked and fried foods, candy, cereals, meat meal, starter feeds, vegetable oils, rubber, latex, polyethylene, and cosmetics have benefited from Tenox antioxidants.

A copy of the folder can be obtained by writing Eastman Chemical Products, Inc., Kingsport, Tenn. Laboratory service is available to manufacturers for assistance in the solution of stabilization problems, and the folder includes a list of Eastman representatives to contact throughout the country.

Beckman Instruments, Inc., announces its new "Zeromatic" (T.M.) pH meter—an automatic instrument with drift-free amplifier which can be adapted for potentiometer recorder output, automatic temperature compensation, and Karl Fischer titrations.



The line-operated instrument features automatic correction for electronic zero drift and rapid push-button control. It has a 0 to 14 pH scale range and two millivolt ranges: 700-0-700 and the extended 0 to 1400 range. The latter is useful for oxidation-reduction titrations. "Zero" can be set at any point on the 0-1400 millivolt scale. To minimize operator reading error, the instrument has a mirror-backed scale



BOOK reviews

Die Entwicklungslinien der landwirtschaftlichen Forschung in Deutschland, by Werner Tornow. xvii+316 pp.; indexed. Landwirtschaftsverlag GmbH, Hilstrup bei Munster (Westf.), Western Germany. Reviewed by C. H. BAILEY, University of Minnesota.

This unique and extensive document traces the evolution of agricultural research in Prussia and Hanover from the early years of the 18th century, and in Germany from the formation of the empire in 1871 to the present time. It details the con-

tribution to German science of such familiar personalities as Johannes Beckman, Julius Kühn, Justus von Liebig, Theodor Roemer, Otto Appel, Fritz Haber, and many others. The origins of numerous scientific societies and academies are outlined, and emphasis is laid upon the role which certain of them played in the stimulation of research and the dissemination of the resulting data and conclusions. Particular attention is given to the creation of special departments in many leading German

universities devoted to agricultural research and instruction, and of agricultural research stations supported by the government. Considerable space in the latter part of the volume is devoted to a discussion of the degree and manner of participation of these and other German research institutions and government departments in international programs developed since World War II. The concluding section concerning current researches is prefaced by an appropriate bit of philosophy which reads: "The living standard of the German people depends upon the state of their research."

■■■■■■■■■■

Briefly Noted . . .

Advances in Agronomy, Vol. 8, ed. by A. G. Norman. Academic Press Inc., New York, 1956.

Research on the Science and Technology of Food Preservation of Ionizing Radiations, by R. S. Hannan. Chemical Publishing Co., New York, 1956.

(pH and millivolt) which eliminates parallax.

These and other attractive features of the instrument are described in Bulletin 705 which can be had from Scientific Instruments Division, Beckman Instruments, Inc., 2500 Fullerton Rd., Fullerton, Calif.

. . . Patter

A definite date is now given for the starch convention of the German Association of Cereal Research, Detmold, Germany, which was announced in the December issue. This meeting will be held on April 24-26, 1957, instead of in May. The other dates are as previously given—cereal chemistry, June 4-6; bakery, Sept. 24-26; milling, Oct. 16-18.

Foreign guests are cordially invited to the meetings, all of which are to take place in the Roemer-Haus of the Association, at Detmold. Last year, guests from 25 nations attended. The programs all deal with actual problems of interest in the grain industry.

The American Society of Brewing Chemists will hold its 1957 con-

vention at the Hotel Barbizon Plaza, New York, May 4-9. The glamor city will display its charms for A.S.B.C. members and guests, as it did a year ago for A.A.C.C. members and their wives, who do not need a list of the entertainment features being planned; memories will take care of it.

An afternoon will be devoted to "curbside" discussions. Groups of members interested in similar topics may gather for discussions in a relaxed and informal manner, in restaurants and other suggested places where they can meet comfortably and without pressure.

The Food and Drug Administration, under a Delegation of Authority from the Federal Civil Defense Administration, has prepared a 4-day basic civil defense training course with the cooperation of a three-man committee from the National Association of Frozen Food Packers, K. G. Dykstra, chairman. These courses, or schools will stress the vulnerability of frozen food plants to chemical, biological, or radiological attack, and present possible solutions to minimize the dangers. Class membership will receive training in the use and cali-

bration of radiation-measuring instruments. Trade association publications will announce the time and place of these schools.

Helicopter service from the Greater Cincinnati Airport direct to the factory 20 miles away is a convenience and a great time-saver for the vice-president of Fries & Fries, Inc., of Cincinnati, Mr. Robert G. Fries, Jr. The service also picks him



up at the plant to make near-by flight connections. The Cincinnati firm specializes in flavorings for the food industry.

Observations

We are now established in our new laboratories and things are beginning to run smoothly again. It has been quite surprising to us to find so many problems involved in moving a laboratory from one location to another.

Our vitamin laboratory is consolidated in one department where both chemical and microbiological procedures can be run. We are confident this will give us a more efficient operation and will certainly speed up our service.

We are continuing our experimental work with flame photometry analysis of trace minerals in feeds and foods. New procedures and techniques are constantly coming to our attention from various workers both in the universities and commercial laboratories. We see a great future in this type of analytical work, although there is much experimental work necessary to perfect such procedures.

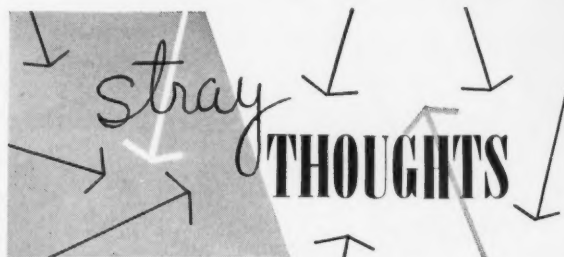
Our new bake shop is completely modernized and enlarged so that we can better serve the milling and baking industries. Dual baking operations in the shop enable us to run either experimental pup loaves on a straight dough procedure or produce substantial quantities of one-pound loaves following the sponge procedure.

It is our hope that all of our friends in the cereal field will visit us when they are next in Kansas City. Our doors are always open to visitors.

Jim Doty

DOTY
*Technical
Laboratories*

1435 Clay St.,
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MILLING FEED ANALYSIS
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BAKING SANITATION



THE VISITOR

Another visitor came to see us the other day. Like most large laboratories, we get quite a few from all parts of the world. The last belonged to a well-defined type and started me thinking about a classification for visitors.

It is possible that I may have a classification complex. Most scientists have. On the other hand, we do not put too much weight on our classifications because we meet so many facts that will not fit neatly into our classes. Alternately, when we define our classes so precisely that all facts are pigeonholed unequivocally, the system generally becomes less rather than more useful.

My last visitor belonged to a class that may be roughly described as being more interested in telling you what he does than in finding out what you do. This is all very fine, but I doubt whether it is sound practice. The information he gave us was wholly by the spoken word; we could have learned as much from him in a hotel room at a convention. But he was making a tour of *our* laboratories, and he could use his eyes as well as his ears. One learns so much more from visiting a man on his home grounds than from meeting him elsewhere, that full advantage should be taken of the opportunity. After all, most of us don't travel any too often; ground rules should be that the home side bats first.

Most of our visitors, whatever their age or status, are thoroughgoing students. They bombard us with questions. But there is a considerable range within this group. I cannot help thinking that some of them are most interested in impressing us with their intelligence and erudition — and they frequently do. Others have the trick of asking good leading questions, and then listening. They rarely

interrupt, save to have some vital point explained more clearly. Some wish to deal only in generalities; others appear too interested in petty and time-wasting detail; most hit a happy medium. With all these studious types, one feels that time has not been wasted, and often that one has gained more than one has given.

Courtesy calls are not uncommon. The visitors are frequently old friends who create a pleasant interval of informal relaxation in my office and know how to get out fast and gracefully when I am busy. "Well, hello Bill (or Frank or Joe). Nice to see you, boy . . ." And away we go for a 10 to 15 minute chat.

My favorite class of visitors is none too well represented in our Visitor's Book. Occasionally, we are honored by some eminent scientist, some great authority in his field. Perhaps he is giving a lecture in the city and comes to us to while away an hour or two, generally knowing that we are doing some work in his field. Such men are mines of information, and we can never keep them long enough; we have so much to learn from them. I think their typical outlook is that they see our small investigation from such a broad perspective: "Ah, yes," they say, "Of course . . ." and away they go from the tricky point you have brought to their attention to paint the background and to bring this new fact into alignment with existing theory. When they are enthusiasts, as so often happens, nothing could be easier, nor more valuable. But sometimes you have to dig hard with good questions of your own; a certain reticent modesty is also a frequent characteristic of the very great.

There goes my buzzer, and my secretary tells me I have another visitor. Which class will he fall into? Probably none that I have mentioned or could dream up.

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